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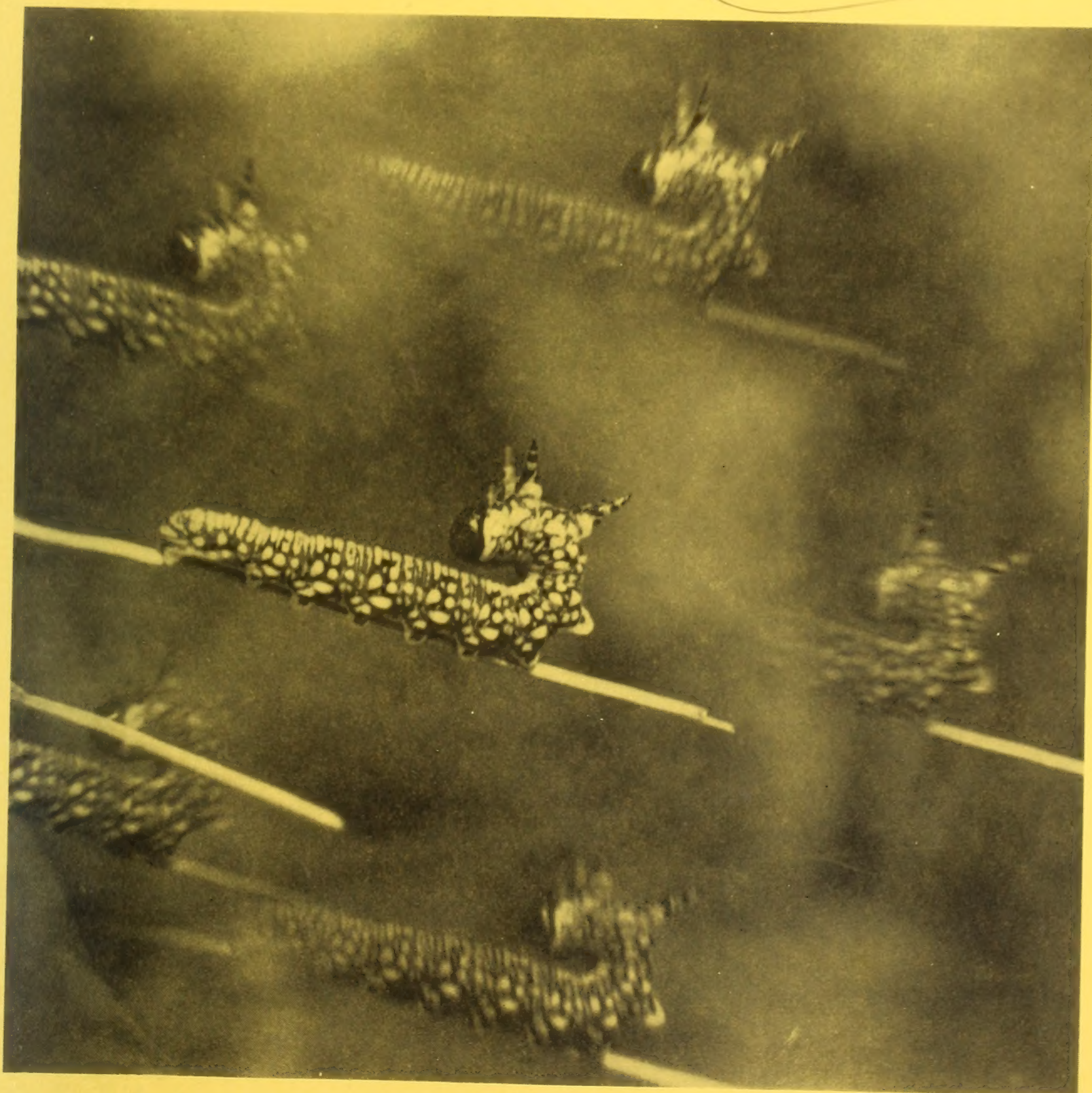
United States
Department of
Agriculture

Forest Service
State & Private Forestry
Southeastern Area

Forest Insect and Disease Conditions in the South, 1981

Forestry Report SA-FR 18

Full



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South Carolina Commission of Forestry
Tennessee Division of Forestry
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Front cover: Introduced pine sawfly larvae.

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FOREST INSECT AND DISEASE CONDITIONS
IN THE SOUTH, 1981

by

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Forestry Report SA-FR 18

July 1982

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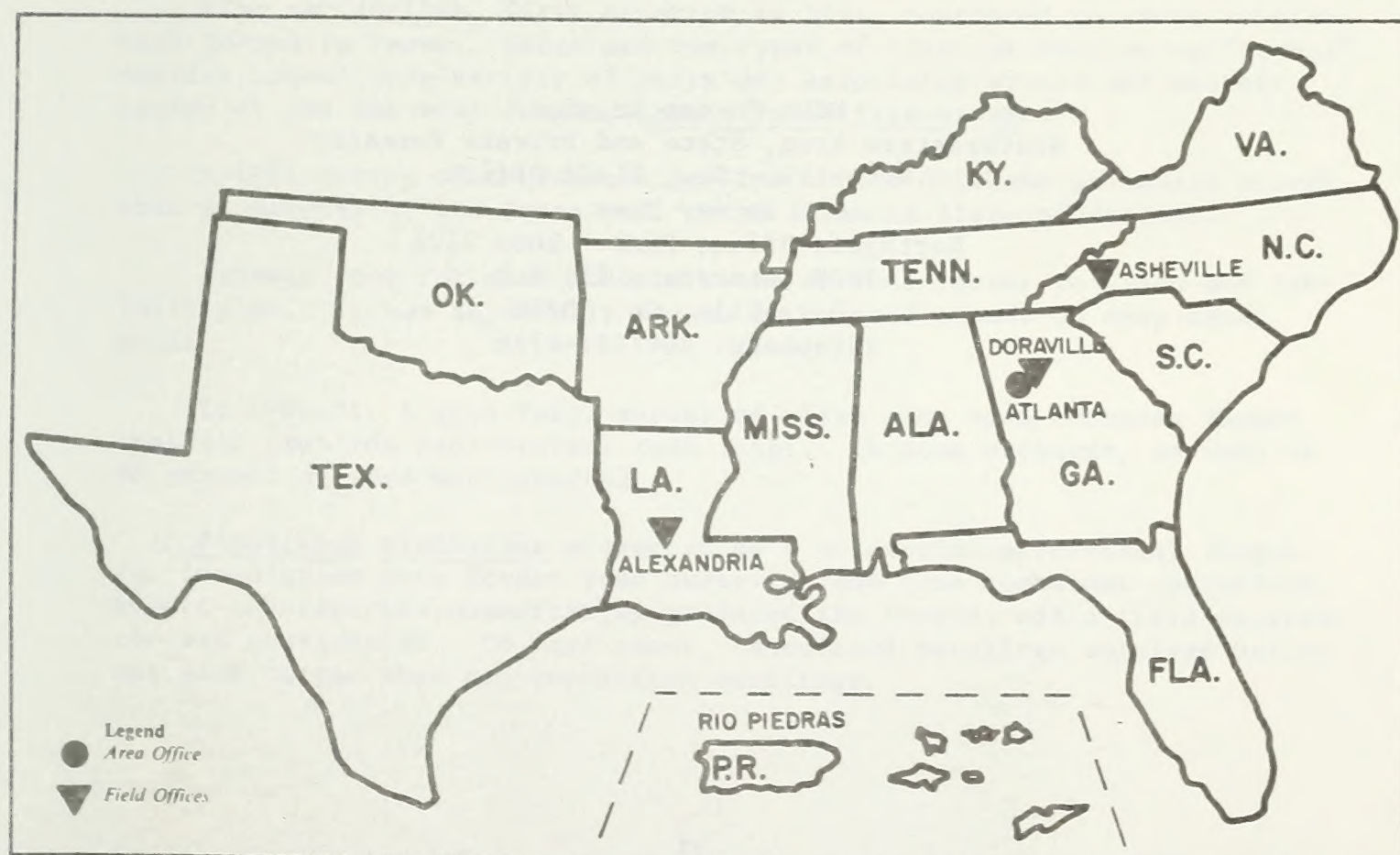
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AREA MAP



Puerto Rico and the Virgin Islands are also served by the Southeastern Area, State and Private Forestry.

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CONDITIONS IN BRIEF

The most significant forest pest problem during 1981 was the continuation of the 1980 drought. Severe dry conditions were responsible for a sharp increase in the incidence of stress-related problems, such as declines and bark beetles.

While southern pine beetle populations virtually collapsed throughout the South, losses due to Ips and turpentine beetles were heavy, particularly in drought-stressed areas.

The introduced pine sawfly infestation in the southern Appalachians continued to expand, encompassing an estimated 10,000 square miles. The USDA Forest Service parasite release program continued to be successful, with up to 75 percent parasitism noted in some areas.

In Texas and Louisiana, Texas leaf cutting ant populations showed a dramatic increase, with over 300,000 pine seedlings killed by this pest in 1981.

Nineteen-eighty data on seed and cone insects showed that the cone-worms continued to cause severe losses throughout the South. An outbreak of the webbing coneworm on the Eastern Seaboard caused extremely heavy losses (up to 100 percent in some areas).

Fusiform rust was still the most significant disease problem of slash and loblolly pine, with losses exceeding \$110 million in stumpage.

Live oak decline, first reported in 1934, continued to cause substantial losses in Texas. There are two types of live oak decline--a "normal" decline caused by a variety of pests and associated stress and another caused by the oak wilt fungus, Ceratocystis fagacearum.

A 1981 survey of cottonwood decline in the Oklahoma panhandle showed that 22 percent of the trees were in an advanced stage of decline.

Annosus root rot continued to cause serious losses to slash and loblolly pine. It was especially severe in thinned stands on deep sandy soils.

In 1980-81, a seed fungi survey of slash pine seed orchards showed that all orchards had internal seed fungi. In some orchards, as much as 88 percent of seed was infected.

Pisolithus tinctorius proved to be a successful mycorrhizal fungus for inoculation into forest tree nurseries and tree container operations. Abbott Laboratories commercially produced the fungus, and a field applicator was constructed. In most cases, inoculated seedlings survived better and grew faster than non-inoculated seedlings.

Fusiform rust, cylindrocladium root rot, pythium root rot, phytophthora root rot, macrophomina root rot, and the lesser cornstalk borer, collectively, caused substantial losses to forest tree seedlings throughout the South.

DROUGHT STRESS AND ASSOCIATED PESTS

Parts of the South were under varying degrees of drought stress. The Figure 1 shows drought conditions for June and October 1981.

There is a direct relationship between data in this map and the occurrence of certain forest tree pests. The declines--which are caused by a variety of factors such as root rots, cankers, borers, site, and age--increased in significance during the 1981 drought. Oak decline and urban tree problems were especially high in the drought areas indicated on the map. There was also a relationship between the drought areas and the occurrence of bark beetles, such as Ips.

These losses to a variety of hardwood and softwood species may not appear to be too serious, since they were scattered over a large area and normally not concentrated in groups. However, if the combined loss over these large areas was calculated, it would probably be very high. Loss estimates are not available, but several areas in the severe drought stress areas have up to 40 percent oak tree mortality. Normally, these trees were on areas of low site index, had a history of pest problems (such as borers and root rot), and were generally mature for the site.

Another area of major concern was plantation failure. In some locations, over 50 percent of the newly established plantations required replanting in 1981 and will probably require replanting in 1982.

Many of these pests will continue to cause volume and quality losses long after the drought has subsided.

STATUS OF FOREST INSECTS

SOUTHERN PINE BEETLE

Significant southern pine beetle (Dendroctonus frontalis Zimm.) activity ceased throughout the South during the summer of 1981. There were no confirmed reports of infestations in Texas, Oklahoma, Arkansas, or Louisiana. Alabama and Mississippi continued to incur losses during the first half of 1981 before populations plummeted.

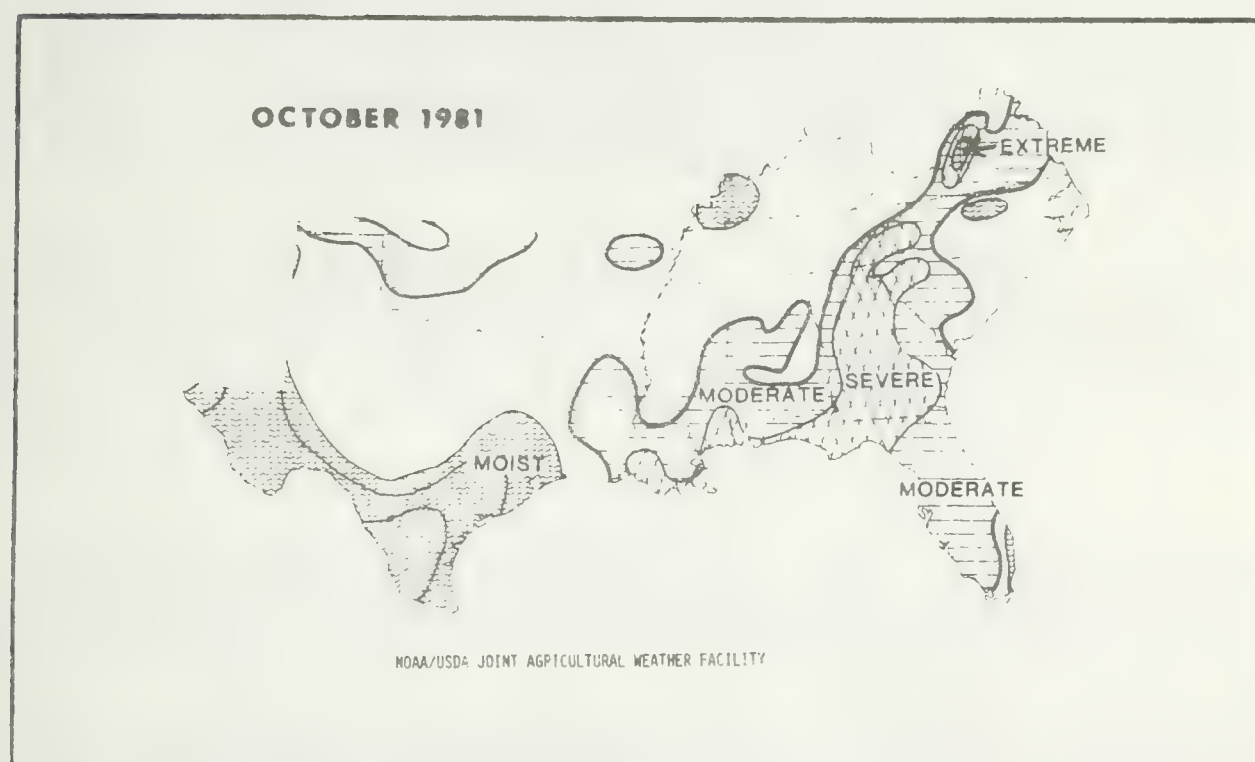
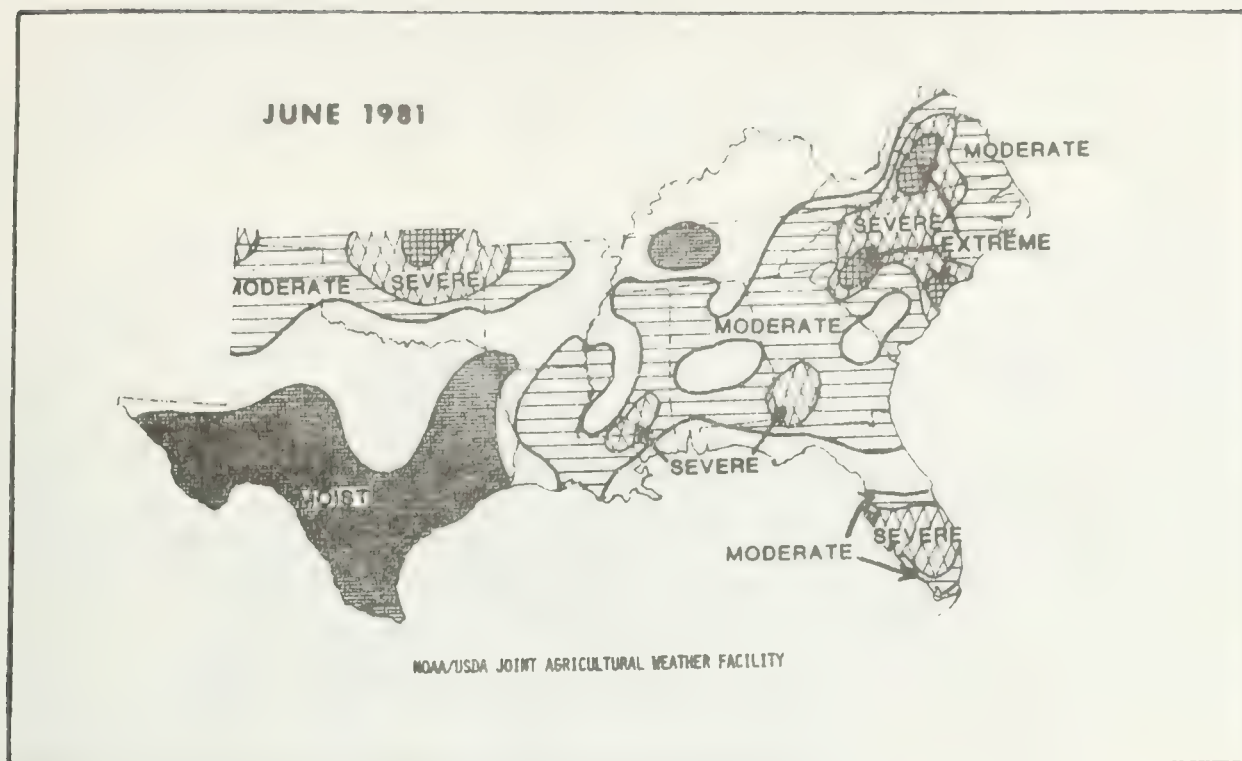


Figure 1—Comparative severity of southeastern U.S. drought in June and October, 1981.

A similar pattern existed in northeastern Georgia, northwestern South Carolina, and extreme eastern North Carolina. Even in these areas, however, spots were few and small. As of September, only one county in Georgia (Hart) was classed as "outbreak" (in excess of one SPB spot per 1000 acres of host--in this case, 1.1 spots). While South Carolina did salvage a substantial amount of SPB-killed timber, most of this was done in early 1981.

Salvage volumes for Georgia, South Carolina, and North Carolina totaled 90,000 cubic feet, 4,102,000 cubic feet, and 36,000 cubic feet, respectively. Total salvage volume for Alabama and Mississippi combined was only 343,000 cubic feet. Here too, the overwhelming bulk of losses occurred in early 1981, with no outbreak counties noted by year's end.

Aerial surveys and ground checks in September showed a few small new SPB spots on the Oconee National Forest (Georgia) and Francis Marion National Forest (South Carolina). While these were of little immediate concern, their correlation with areas of heavy drought may foreshadow more serious losses in the spring and summer of 1982.

Southeastern Area SPB outbreak counties are shown in figure 2.

IPS AND TURPENTINE BEETLES

Activity by pine bark beetles other than SPB was intense throughout much of the South, especially in Alabama, Georgia, and the Carolinas, where drought conditions reduced tree vigor. On the Oconee and Francis Marion National Forests, Ips and black turpentine beetle (Dendroctonus terebrans [Olivier]) activity was serious enough to justify surveillance and control activity. Ordinarily, infestations by these normally secondary pests are not serious enough to justify salvage treatment, but in 1981 land managers increasingly found this practice to be economically feasible.

In areas of Georgia and Florida where pine bark beetles were associated with other factors, such as fire, the compounding drought factor resulted in several unusually severe and virulent infestations. A dry winter may result in additional heavy losses next year.

INTRODUCED PINE SAWFLY

Pheromone trapping surveys in North Carolina, Tennessee, and Virginia showed that the introduced pine sawfly (Diprion similis Hartig) infestation in the southern Appalachians had increased from 6,000 square miles to 10,000 square miles (figure 3).

It should be noted that the infestation almost coincided with the eastern and western limits of the host's (white pine) distribution. Most of the advance of the infestation occurred from the Southwest to Northeast. Eventually, the sawfly is expected to be found throughout the native range of eastern white pine.



Figure 2—SPB outbreak counties in the southeastern United States.

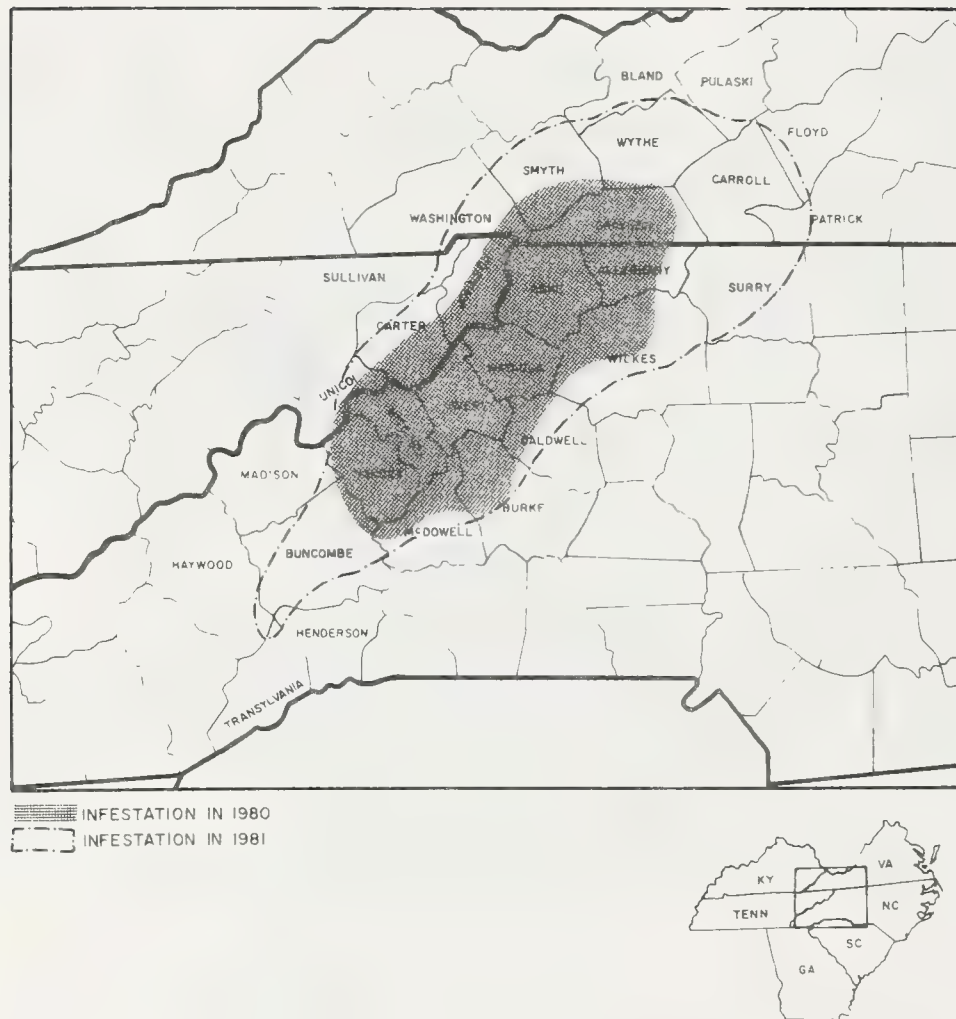


Figure 3—Spread of introduced pine sawfly, *Diprion similis*, in southern Appalachians.

The biological control project initiated in 1980 continued with excellent results. Defoliation within the control area was reduced to less than 10 percent. Parasitism by the released parasite Monodontomerus dentipes approached 75 percent in some release areas. With control achieved in the heavily infested areas, parasite release is now being directed at the advancing edges when sawfly populations are first reported.

TEXAS LEAF CUTTING ANT

The Texas leaf cutting ant or town ant (Atta texana [Buckley]) occurred in increasing numbers over east Texas and west-central Louisiana. Its range was restricted to eight parishes in Louisiana and 18 counties of east Texas (figure 4).

These ants are serious pests of young pine seedlings. They remove needles, buds, and sometimes bark from natural and newly-planted pine seedlings of all species. They also cut foliage from other plants, but concentrate on pines during the winter and early spring when other green material is unavailable. The ants remove the foliage and take it back to their colony to culture a fungus garden in underground cavities.

The colonies generally occur on deep sandy soils and are made up of conspicuous surface mounds and extensive underground passageways and cavities. Populations exceeding two million ants may live in one nest. Where these ants are established, they make it very difficult to regenerate pine.

Much of the lost acreage will require replanting. Conservative estimates of losses caused by the town ant during 1981 exceeded 300,000 pine seedlings.

BALSAM WOOLLY APHID

As reported last year, the balsam woolly aphid (Adelges picea [Ratzeburg]) is now found within every significant concentration of Fraser fir in the southern Appalachians (figure 5).

While populations were no doubt expanding, no significant new infestations were discovered in 1981. North Carolina State University, the USDA Forest Service, and several other governmental agencies are cooperating in a long-term provenance test to determine if fir trees from selected geographic areas are resistant to aphid infestations or aphid-induced mortality.



Figure 4—Distribution of Texas leaf cutting ant, *Atta texana*.



Figure 5—Distribution of Fraser fir in the southern Appalachians.

During 1981, a balsam woolly aphid control project was conducted on Roan Mountain in the Toecane Ranger District of the Pisgah National Forest in North Carolina. Approximately 230 acres of Fraser fir were treated. This area is the only protected Fraser fir site on public lands throughout the range of the tree species.

SEED AND CONE INSECTS

Loblolly cone production reached record proportion in 1981, with most orchards experiencing bumper crops. The North Carolina Tree Improvement Cooperative reported the tentative loblolly harvest at nearly 60,000 bushels, which represents 80,000 to 90,000 pounds of seed. The previous high was in 1979, when 38,693 bushels were collected. In many orchards, this increase in cone production was primarily attributed to improved insect control measures such as spray timing and aerial application. In 1981, the webbing coneworm (Dioryctria disclusa Heinrich) was effectively controlled by applying Guthion six days after peak pollen flight. In comparison, during 1980 many orchards on the Eastern Seaboard experienced heavy loblolly cone losses totaling over 4,600 bushels.

Several orchards reported late season attacks by the coneworms (D. amatella [Hulst] and D. clarioralis [Walker]). Actual losses for 1981 are unknown at this time, but appear to be limited to a few orchards. Overall, coneworm damage in 1981 was reduced over previous years.

Seedbug (Leptoglossus corculus [Say] and Tetyra bipunctata [H.-S.]) damage was again detected in many untreated orchards. In general, the use of chemical control kept this pest in check.

White pine cone beetle (Conophthorus coniperda [Schwarz]) damage varied greatly between orchards. The North Carolina Forest Service orchard received heavy damage, while the USDA Forest Service orchard near Murphy, N.C., recorded little damage.

The slash pine thrips (Gnophothrips fuscus [Morgan]) caused significant damage to the 1981 flower crop of slash pine in Florida, Georgia, and Alabama.

Midge (Cecidomyia piniinopsis Oster Sacken) damage was detected in one Alabama orchard, destroying an estimated 30 percent of the loblolly conelet crop. This was the only orchard reporting this pest.

Beginning in May, 68 southern loblolly pine seed orchards initiated a southwide pheromone trapping program for adult male D. disclusa in 12 southeastern states. The resulting catch data indicate high potential damage to unsprayed orchards in 18 of the surveyed orchards. These identified orchards face potential damaging populations of D. disclusa in 1982.

Several innovative techniques for insect control in seed orchards were introduced during 1981, including the use of insect pheromones to predict future damage, and the aerial application of insecticide. This technology has reduced insecticide usage and improved control through better timing of applications.

In 1982, orchards will be able to use Pydrin for the control of seed and cone insects. This product has been evaluated by Forest Service entomologists for three years, and this insecticide has been found to be effective.

GYPSY MOTH

The most significant gypsy moth (Lymantria dispar [L.]) activity was reported in northern Virginia, northern Arkansas, and southeastern South Carolina. In Virginia, there were five known infestations (one in Loudoun County, three in Fairfax County, and one in Fauquier County). There were 200 acres sprayed in Lunenburg County, and no male moth catches have been reported. Officials are considering designating the northern tier of counties as "generally infested." Elsewhere in Virginia, over 20,000 male moths were trapped.

In Arkansas, a well established 5-10 acre infestation was discovered in Fulton County near the Missouri border. An eradication spray project is being planned for 1982.

A potential gypsy moth infestation may be established in Horry County near Little River, S.C. A trapping survey in 1981 caught 48 male moths in this location, with 25 in one trap and a total trap catch for the county of 231 male moths. Two vacated pupal cases and one vacated egg mass were also recovered. An evaluation will be conducted in December to determine the need for an eradication project.

In North Carolina, 55 counties have had trap catches of male moths; a number of these counties have had multiple trap catches. A concentration of moths has been in counties along the coast and in counties north of the Raleigh-Durham area. Because of the concentration of moths in the Raleigh grid, an egg mass survey is planned for this winter.

Florida had a significant increase in the number of multiple moth trap catches, generally from Escambia County in the Panhandle to the Tampa-Winterhaven area.

Male moths were also trapped in Alabama (2 counties) and Georgia (5 counties).

REPRODUCTION WEEVILS

<u>Insect</u>	<u>Host(s)</u>	<u>Location</u>	<u>Remarks</u>
Pales weevil, <u>Hylobius pales</u> (Herbst) and <u>Pachylobius</u> <u>picivorus</u> (Germar)	Various southern pines.	Southeastern Okla., western N.C., and north- ern Ga.	Severe scattered damage in several plantations. Heavy losses in western N.C. and northern Georgia Forest Service progeny test areas.

PINE DEFOLIATORS

Virginia pine sawfly, <u>Neodiprion</u> <u>pratti pratti</u> (Dyar)	Various southern yellow pines.	N.C. and Ky.	Scattered and locally severe.
Arkansas pine sawfly, <u>N. taedae</u> <u>linearis</u> Ross	Southern yellow pines.	Graves, Calloway, and Marshall Counties, Ky.	Moderate to severe defolia- tion.
Redheaded pine sawfly, <u>N. lecontei</u> (Fitch)	Various southern yellow pines.	Highland County, Va. Various loca- tions in Ala., Miss., Tex., and Adair, Rowan, and Caldwell Counties, Ky.	Locally severe.
Loblolly pine sawfly, <u>N. taedae</u> <u>taedae</u> Ross	Various southern yellow pines.	Miss., Ark., and Grant Parish, La.	Moderate to severe defolia- tion.
Blackheaded pine sawfly, <u>N. excitans</u> Rohwer	Loblolly pine.	Montgomery and Bastrop Counties, Tex.	Moderate to heavy defoliation, but no mortality.

PINE DEFOLIATORS (con't)

<u>Insect</u>	<u>Host(s)</u>	<u>Location</u>	<u>Remarks</u>
White pine sawfly, <u>N. pinetum</u> (Norton)	Eastern white pine.	Clark and Wythe Counties, Va.; Augusta Seed Orchard, Va.	Light defoliation.
Other pine sawflies, <u>Neodiprion</u> spp.	Various pines.	Ala., Miss., Tex., Ky., Va., Moore County, N.C., and Patrick, Prince Edward, Rockingham, and Sussex Counties, Va.	Heavy local populations.
Bagworm, <u>Thyridopteryx ephemeraeformis</u> (Haworth)	Various hardwood and softwood species.	Forsyth and Gaston Counties, N.C.; Greenville, Emporia, Rockingham, Wythe, and Essex Counties, Va.; Russell, Pulaski, Hopkins, Calloway, Fleming, and McCracken Counties, Ky.	Severe local defoliation.
Pine looper, <u>Lambdina pellucideria</u> (G. & L.)	Virginia pine.	Buckingham and West Point Counties, Va.	Populations at high levels.
Pine webworms, <u>Tetralopha robustella</u> Zell.	Virginia and Scotch pines.	Bell County, Ky.	Unusually high populations.
Cypress looper, <u>Anacamptodes pergracilllis</u> (Hulst.)	Cypress.	Southern Fla.	Populations in in Big Cypress National Park; up dramatically (an estimated 10,000 acres defoliated) near Fish-eating Creek.

MERISTEM FEEDING INSECTS

<u>Insect</u>	<u>Host(s)</u>	<u>Location</u>	<u>Remarks</u>
Nantucket pine tip moth, <u>Rhyacionia</u> <u>frustrana</u> (Comstock)	Various southern yellow pines.	Okla. and Ark.; Cleveland and Rockingham Counties, N.C.; Nottoway and Essex Counties, Va.; Hardin, Carlisle, Hopkins, and Adair Counties, Ky.	Caused shoot die- back in planta- tions.

SUCKING INSECTS

Hemlock woolly aphid, <u>Adelges tsugae</u> (L.)	Hemlock.	Franklin, Mont- gomery, Rock- bridge, Floyd, and Bedford Counties, Va.; Quantico Marine Corps Base; and Jefferson National Forest.	Spreading from light infesta- tions in these counties.
Eastern spruce gall aphid, <u>Adelges abietis</u> (L.)	Red spruce.	Shenandoah National Park.	Light local infestation.
Pine leaf adelgid, <u>Pineus</u> <u>pinifoliae</u> (Fitch)	Eastern white pine.	Mt. Mitchell near Highlands and Cashiers, N.C.	Damaging where white pine and red spruce (its alternate host) occur together.

HARDWOOD DEFOLIATORS

Oak leaf tier and roller, <u>Croesia</u> <u>semipurpurana</u> (Kearfott) <u>Archips</u> <u>semiferanus</u> (Walker)	Oak.	Land between the Lakes, Breathitt County, Ky.; Waynesboro, Blue Ridge Parkway, Va.; northwestern Ala.	Light defoliation in Ky.; heavy in Va. and Ala.
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HARDWOOD DEFOLIATORS (con't)

Insect	Host(s)	Location	Remarks
Forest tent caterpillar, <u>Malacosoma</u> <u>disstria</u> Hubner	Various hard-woods.	N.C., Va., Ky., La., and Ala.	Light to severe defoliation; 10,000 acres defoliated in eastern Va.; La. and Ala. defoliation confined to bottomlands.
Fall cankerworm complex, <u>Alsophila</u> <u>pometaria</u> (Harris)	Various hard-woods.	Jackson County, N.C.; Va., Taylor County, Ky., and Ark.	Light to severe defoliation.
Spring cankerworm complex <u>1/</u> , <u>Paleacrita</u> <u>vernata</u> (Peck)	Various hard-woods.	Land between the Lakes, Ky., Okla., Ark., and Va.	Locally heavy in Ky.; light in Okla. and Ark.; severe in Prince William County, Va.
Eastern tent caterpillar, <u>Malacosoma</u> <u>americanum</u> (F.)	Various hard-woods, esp. black cherry.	Bland and Wythe Counties, Va.; Gainesville and Alachua, Fla.; Ky.; Forsyth County, N.C.	Defoliation light to severe.
Locust leaf miner, <u>Odontota</u> <u>dorsalis</u> (Thunberg)	Black locust.	Mountains and Piedmont of N.C.; Montgomery, Pulaski, Giles, Bath, Rockbridge, and Salem, Va.	Defoliation heavier than normal in most areas.
Elm leaf beetle, <u>Pyrrhalta</u> <u>luteola</u> (Muller)	Elm.	Essex County, Va.; Forsyth County, N.C.; Graves County, Ky.; Okla.	A severe shelter-break problem in Okla.; moderate to heavy elsewhere.

1/ Includes linden looper and Phigalia titea.

HARDWOOD DEFOLIATORS (con't)

<u>Insect</u>	<u>Host(s)</u>	<u>Location</u>	<u>Remarks</u>
Fall webworm, <u>Hyphantria</u> <u>cunea</u> (Drury)	Various hard- woods, esp. pecan and persimmon.	Annandale, Lunen- burg, and Wythe Counties, Va.; Rowan, Bayle, Fleming, Montgomery, Scott, Franklin, Hardin, and Meade Counties, Ky.	Generally heavy defoliation.
Poplar tent- maker, <u>Ictyura inclusa</u> (Hubner)	Cottonwood and willow.	La. (Miss. and Atchafalya River Basins).	Light defoliation in natural stands.
Walnut cater- pillar, <u>Datana</u> <u>integerrima</u> Grote and Robinson	Black walnut and pecan.	Lewis and Trigg Counties, Ky.; Okla.	Heavy local defoliation.
Walkingstick, <u>Diapheromera</u> <u>femorata</u> (Say)	Various hard- woods.	Western Ark.	Localized moder- ate defoliation.

STATUS OF FOREST DISEASES

FUSIFORM RUST

Fusiform rust, caused by Cronartium quercuum (Berk.) Miy ex Shirai f. sp. fusiforme, continued to be the most serious disease of slash and loblolly pines. The disease was most severe in a wide land corridor from southeastern Texas to North Carolina (figure 6). The heaviest damage occurred in an area extending from Louisiana to southeastern South Carolina.

According to Renewable Resources Evaluation data, there are about 42,990,600 acres of slash and loblolly pine in the South. Of this, about 13,857,676 acres had at least 10 percent of the trees infected, and about 2,503,000 acres had at least 50 percent of the trees infected. (See Tables 1 through 5 for more information on the occurrence of fusiform rust.)

Annual losses were estimated at 562 million board feet of sawtimber and 194 million cubic feet of growing stock, which translates into about a \$110 million annual loss. This amounts to about \$2.2 billion in finished product.

The Resistance Screening Center (RSC) screened 647 seedlots for resistance to fusiform rust in 1981. Through improved data collection procedures, the r^2 value for RSC to field correlation was improved from 0.3 to 0.7.

This disease is expected to be a serious pest for many years. But, through an integrated approach of breeding for resistance, site and species selection, and close monitoring of plantations, the losses can be reduced substantially. In 1981, an integrated pest management decision key (computer model) was developed to assist the resource managers in reducing the losses caused by fusiform rust.

A pilot test to determine the feasibility of using Renewable Resources data to assess losses caused by fusiform rust was also initiated in 1981.

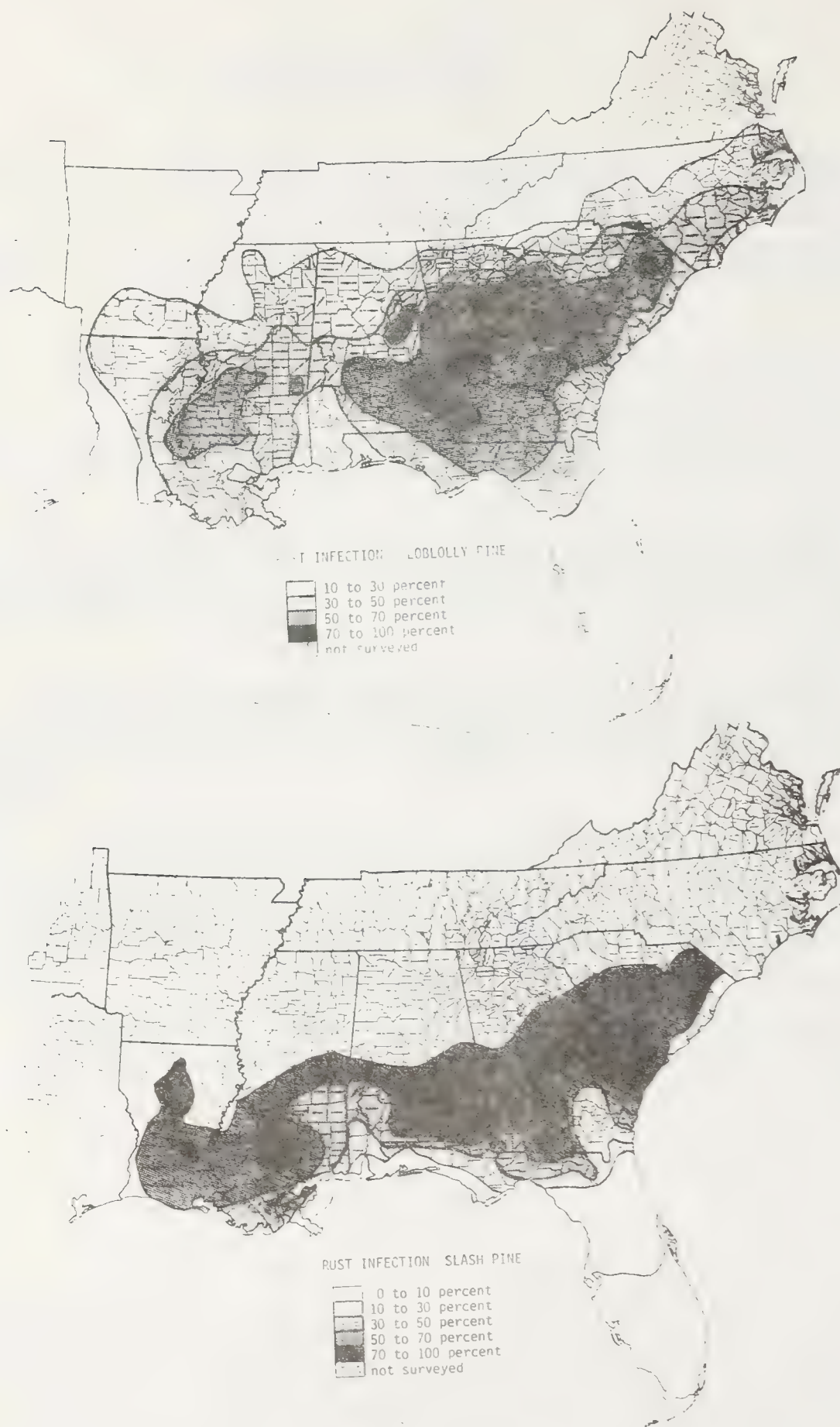


Figure 6—Severity of fusiform rust on loblolly and slash pine.

Table 1.--Slash and loblolly acres with at least 10 percent of the trees infected with fusiform rust.

State	National Forest	Other Federal	State	Private
Alabama	61,900	20,100	20,100	1,938,900
Arkansas	6,500	1,200	800	50,400
Florida	47,000	28,400	22,500	1,020,200
Georgia	78,500	71,600	14,800	3,871,700
Louisiana	61,300	15,700	31,400	1,461,700
Mississippi	86,500	6,700	6,800	1,585,200
North Carolina	28,700	9,600	9,700	1,296,300
South Carolina	73,081	45,819	14,699	1,362,877
Texas	36,500	1,300	1,400	461,800
Virginia	-	-	-	6,000
Acres infected -	479,981	200,419	122,199	13,055,077

Table 2.--Slash and loblolly acres with at least 20 percent of the trees infected with fusiform rust.

State	National Forest	Other Federal	State	Private
Alabama	39,101	12,060	12,060	1,145,768
Arkansas	4,408	678	393	28,484
Florida	48,920	29,555	23,457	994,120
Georgia	49,185	52,856	8,132	2,948,892
Louisiana	32,477	8,407	16,815	781,909
Mississippi	57,246	4,105	4,237	964,608
North Carolina	12,811	4,389	4,493	581,176
South Carolina	49,901	20,775	30,659	839,183
Texas	17,250	696	103	324,218
Virginia	-	-	-	5,400
Acres infected -	311,299	133,521	100,349	8,613,758

Table 3.--Slash and loblolly acres with at least 30 percent of the trees infected with fusiform rust.

State	National Forest	Other Federal	State	Private
Alabama	26,631	8,138	8,138	773,156
Arkansas	2,282	427	213	17,951
Florida	31,552	19,063	15,129	640,446
Georgia	32,309	36,564	5,625	2,039,947
Louisiana	20,954	5,456	10,913	507,470
Mississippi	38,991	2,758	2,852	648,262
North Carolina	8,074	2,782	2,860	370,650
South Carolina	33,258	14,114	20,829	569,709
Texas	10,850	438	65	204,462
Virginia	-	-	-	4,300
Acres infected -	204,901	89,740	66,624	5,776,353

Table 4.--Slash and loblolly acres with at least 40 percent of the trees infected with fusiform rust.

State	National Forest	Other Federal	State	Private
Alabama	17,839	5,390	5,390	512,102
Arkansas	1,682	258	129	10,868
Florida	19,725	11,917	9,458	399,741
Georgia	20,691	24,941	3,837	1,391,471
Louisiana	13,100	3,439	6,879	319,894
Mississippi	26,118	1,818	1,884	427,245
North Carolina	4,888	1,698	1,756	228,171
South Carolina	16,214	9,425	13,910	380,113
Texas	5,653	265	40	123,788
Virginia	-	-	-	3,540
Acres infected -	125,910	59,151	43,283	3,796,933

Table 5.--Slash and loblolly acres with at least 50 percent of the trees infected with fusiform rust.

State	National Forest	Other Federal	State	Private
Alabama	11,180	3,366	3,366	319,800
Arkansas	1,018	156	78	6,578
Florida	12,077	7,296	5,791	244,631
Georgia	12,776	7,834	2,419	877,196
Louisiana	8,022	2,112	4,225	196,450
Mississippi	16,370	1,133	1,175	266,373
North Carolina	2,959	1,030	1,069	138,946
South Carolina	13,479	5,901	8,710	237,941
Texas	3,965	161	24	74,973
Virginia	-	-	-	2,416
Acres infected -	81,846	28,989	26,857	2,365,304

LIVE OAK DECLINE

Live oak decline was first reported in Texas in 1934. Since then, the disease has been identified in about 100 Texas counties. Virginia is the only other state for which there is a written report of live oak decline, but verbal reports from personnel in North Carolina, South Carolina, Florida, Mississippi, Louisiana, and Oklahoma indicate a decline of live oaks is occurring in these states.

Several symptoms of live oak decline appear in an established sequence. First, the leaves show a marginal water soaking, followed sequentially by chlorosis, bronzing, and finally, necrosis, which gradually spreads inward. Defoliation is the final outcome of this process.

Affected branches can reflush, and suckers commonly develop on the trees. When either of these conditions occur, the new leaves are smaller and more yellow than normal. During this process, the tree crown appears thin.

Both the vascular system and the heartwood of affected trees can show a brownish discoloration and can have a slight odor of acetone, although these symptoms are rare.

Several tree species are affected. The initial report was made on the decline of live oak (Quercus virginiana Mill.). In Texas, decline and mortality are occurring on post oak (Q. stellata Wangenh.), water oak (Q. nigra L.), southern red oak (Q. falcata Michx.), and laurel oak (Q. laurifolia Michx.). The major impact of this disease is seen in the urban environment.

The most recent information indicates the disease is caused by Ceratocystis fagacearum (Bretz) Hunt, the fungus which causes oak wilt. However, some confusion still exists as to the etiology of this problem. C. fagacearum has been isolated only from recently infected hosts displaying early symptoms.

Several other wilt- or canker-causing fungi are associated with the disease. Cephalosporium diospyri Crandall is still considered to be a fungus in the decline syndrome. Also associated with the decline are the canker-causing fungi Botryodiplodia theobromae, a Hypoxylon sp., Dothiorella quercina, an unidentified Endothia sp., a Phialophora sp., and a species of Dendrophoma. Species of Verticillium, Coryneum, and Fusarium have also been reported present.

Further work is in progress to clarify the causes, etiology, distribution, and impact of this disease.

COTTONWOOD DECLINE

A continuing and severe decline of cottonwood trees over the last few years along the Beaver River and its tributaries in Texas County, Okla., has caused much landowner concern. Dieback, mortality, and cankering were known to be present, and a cooperative survey was made in 1981 by the USDA Forest Service's, Forest Pest Management staff and the Oklahoma Division of Forestry, with support of Oklahoma State University Extension Service.

Sixty-three plots were examined along 150 miles of riparian woodland. During this examination, trees were rated for crown decline and extent of cankering. Results indicated that 22 percent of the cottonwood trees were in an advanced state of decline, and 31 percent of all the cottonwoods were seriously cankered. Decline and mortality occurred more frequently in the 1-10" dbh size class and in geographic pockets or stretches of the waterways.

Over seven genera of fungi were isolated from sampled trees, with Cytospora sp. being most frequently recovered (31 percent). While some cankering may be attributed to Cytospora sp. and other fungi, the overall decline of the trees was probably not a result of the cankering. In addition, no insect infestations were observed. Incidence of grazing, however, was present and heavy in many sampled stands.

The decline appears to be the result of severe and long-term moisture stress from the alteration and lowering of ground water levels by irrigation wells. Wells tapping the relatively shallow alluvium (bearing water directly associated with the waterways) have been monitored since 1966, and the depth of the water table has declined from 14.78 feet in 1966 to 17 feet in 1980. Depth to water in the deeper Ogallala aquifer has also increased. In addition, well readings are taken in January, the time of maximum annual recovery of the water table. During the summer pumping season, however, a cone-shaped depression forms in the water table, drawing it down much farther. When wells are closely spaced, these cones may merge and cause a drastic reduction in water levels over relatively large areas. This fluctuation comes at a time when rainfall in the plains is scarce and transpirational demands on trees are the greatest.

This type of problem is occurring around other high plains streams, where irrigation development has been heavy. The future existence of the riparian cottonwoods along the Beaver River is tenuous; total loss of this resource is expected. The past rate of irrigation development is probably tapering off. However, development is continuing, and as long as water is available and economical to pump, irrigation will continue. This long-term stress on cottonwood will continue to intensify, and the decline will spread as water levels and surface flows are further reduced. Rising demands for food, the high value of irrigated crops, and the need to maximize production and profits of farms will preclude any wide-scale remedial changes in irrigation practices in the near future.

ANNOSUS ROOT ROT

Annosus root rot, caused by Heterobasidion annosum (Fr.) Bref., is a damaging disease in the southeastern United States. The disease affects all commercial species of southern yellow pine and many other noncommercial or ornamental species. It continues to be a problem primarily in thinned plantations. Based on survey results, it is estimated that about 3 percent of the loblolly and slash pines in the Southeast are dying or dead as a result of annosus root rot.

There is a definite correlation between soil type and annosus hazard. Soils with low water tables and 12 inches or more of sandy or loamy soil above clay are high hazard. The majority of annosus mortality occurs on these high hazard sites. However, other high hazard sites, where the normal consequence of infection is not death, have recently been recognized. These two types of hazard zones are presented in figure 7.

During the past year, a computerized system (Integrated Pest Management - Decision Key) has been developed to help land managers make management recommendations for annosus infected, annosus prone, or currently uninfected areas.

SEED FUNGI

Seed fungi have long been recognized as a problem in agronomic crops throughout the United States. Fungi attacking forest tree seed have received little attention until the last few years. The total involvement of seed fungi in damaging forest tree seed is not yet known. It is known that these fungi can cause flower, cone, and seed losses in slash pine, and that infected seed can serve as an inoculum source for damping-off in nursery beds.

Use of infected seed may also introduce pathogens which can infect the seedlings and cause death in the nursery beds or, after lifting, be transported to the outplanting sites where additional losses may occur. A major concern with the seedborne pathogens of slash pine is preventing these organisms from being shipped to areas where they do not now occur.

In a 1980-81 southwide survey of slash pine seed fungi, all evaluated seed had some fungi, with as much as 88 percent internal fungi in one orchard and as low as 15 percent in another. One orchard had internal, known pathogenic, fungi (Fusarium moniliforme var. subglutinans, Diplodia sp., or Fusarium sp.) in 43 percent of the sound seed and 31 percent of the unsound seed.



Figure 7—Geographic hazard for annosus root rot, 1981. The black area indicates where death is the normal consequence of infection, while the gray area indicates where growth loss is the normal consequence.

MYCORRHIZAE

The nursery phase of the national Pisolithus tinctorius (P.t.) ectomycorrhizae nursery evaluation was concluded in May 1981. Successful P.t. inoculations were obtained in over 75 percent of the combined 33 bareroot and 18 container seedling nurseries. Significant increases in total ectomycorrhizae development and seedling fresh weights, along with decreased seedling culls, were obtained in most cases.

Over 30 outplantings have been established on reforestation and reclamation sites across the United States. Field survival and early growth on P.t. nursery inoculated trees have been increased in most cases, compared to uninoculated trees. One 8-year-old outplanting on a routine reforestation site in western North Carolina is still showing a more than 25 percent increase in tree growth (based on plot volume) on P.t. nursery inoculated loblolly, Virginia, and eastern white pine, compared to uninoculated trees of the same species.

An ectomycorrhizal inoculum applicator-nursery tree seeder was field tested in four southern nurseries in 1980 and 1981. The results indicated that commercial P.t. vegetative mycelium inoculum can be effectively and practically used in machine injected, row-drilled applications (figures 8 and 9).

Use of this technique provides significant savings in relatively expensive commercial P.t. inoculum (67 percent reduction, compared to standard broadcast applications), labor, and time. During 1981, the R. A. Whitfield Forestry Equipment Company in Mableton (Atlanta), Ga., constructed a production model of the Forest Service P.t. inoculum applicator-tree seeder.

Other P.t. inoculation techniques include P.t. spore encapsulated seed treatments, spore granules, and spores mixed with hydromulch. Operational, commercial P.t. MycoRhiz inoculations were made in four southern and one central U.S. nursery in 1981 using the Forest Service inoculum applicator-tree seeder. These inoculations involved over one million seedlings and five pine species: loblolly, slash, Virginia, eastern white, and red.

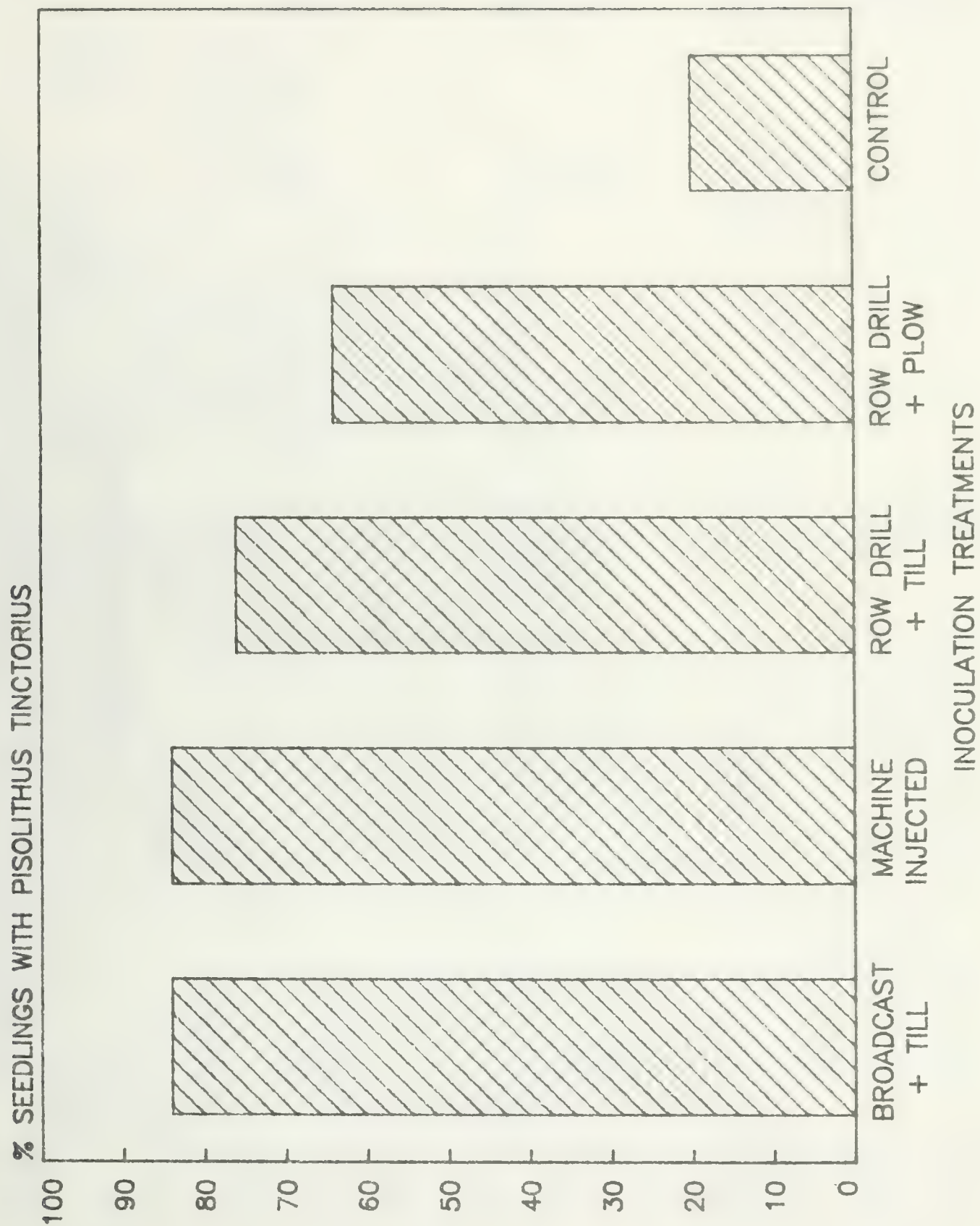


Figure 8—Effectiveness of four inoculation techniques (3 P.t. inoculum applicator-nursery seeder; 1 standard broadcast) in the formation of P.t. ectomycorrhizae on loblolly pine seedlings in a South Carolina nursery.

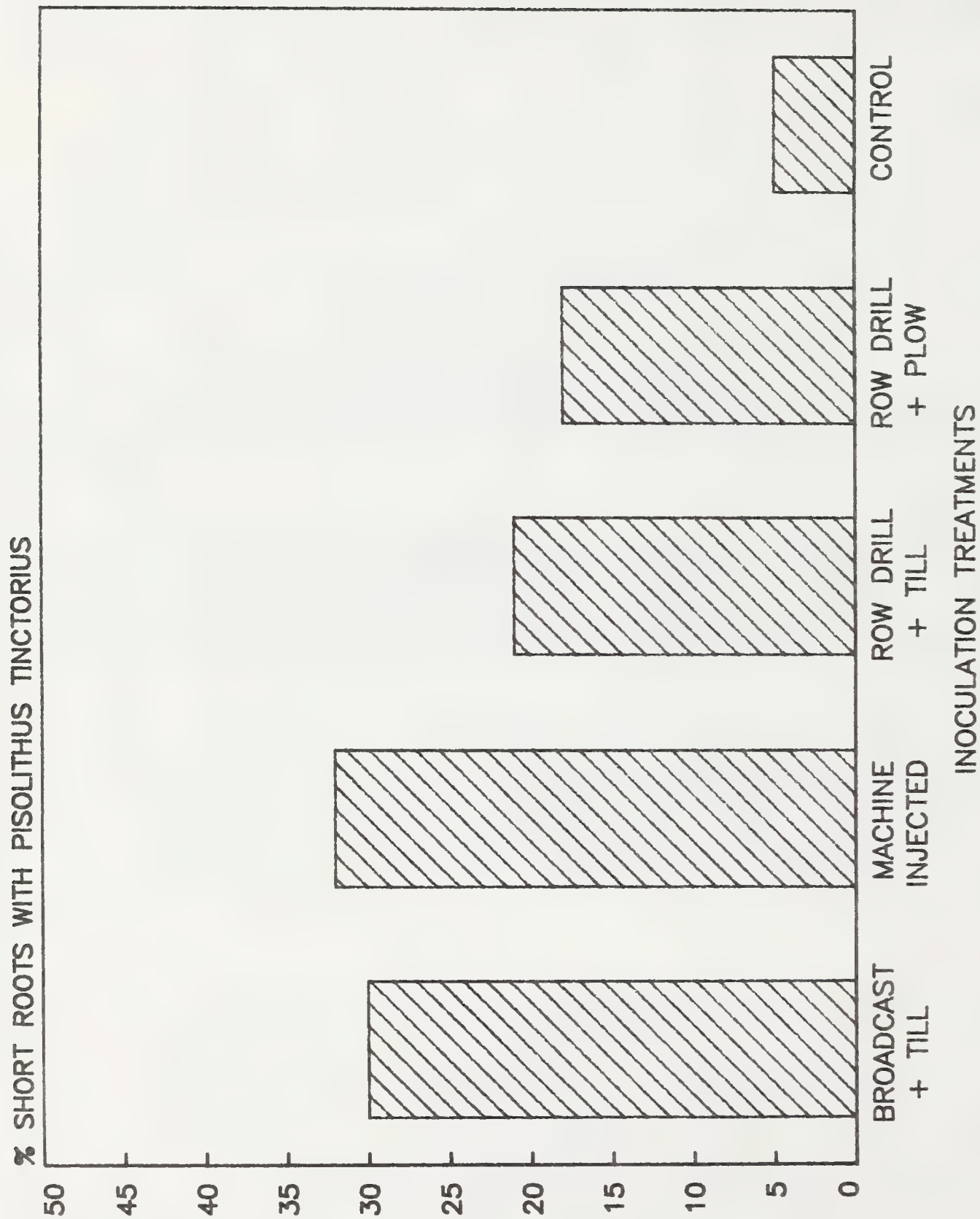


Figure 9--Effectiveness of four inoculation techniques (3 P.t. inoculum applicator-nursery seeder; 1 standard broadcast) in the formation of P.t. ectomycorrhizae on loblolly pine feeder roots in a South Carolina nursery.

ANTHRACNOSE, BLIGHT, DECLINE, OR WILT

<u>Disease</u>	<u>Host(s)</u>	<u>Location</u>	<u>Remarks</u>
Sycamore anthracnose, <u>Gnomonia</u> <u>platani</u> Edg.	American sycamore	Throughout range of sycamore.	Light to moderate defoliation with branch dieback.
Walnut anthracnose, <u>Gnomonia</u> <u>leptostyla</u> (Fr.) Ces. & de Not.	Black walnut	Throughout walnut range.	Moderate to light defoliation. More severe on stressed sites.
Hardwood anthracnose <u>Gnomonia</u> sp.	Red oak, hickory, maple, and ash	N.C., S.C., Ky., Tenn., and Va.	Light defoliation.
Oak wilt, <u>Ceratocystis</u> <u>fagacearum</u> (Bretz) Hunt	Oak	N.C., S.C., Tenn., Ky., Ark., Okla., and Tex.	The disease remains at endemic level.
Dutch elm disease, <u>Ceratocystis</u> <u>ulmi</u> (Buism.) C. Mor.	Elm	Ga., Ky., N.C., S.C., Ala., Ark., and Okla.	Mortality is highly variable depending on when the disease was first reported in an area. Some states, like Ala., have single tree reports, while other areas, such as Ky. and Va., have extensive areas of mortality. The disease is more common along drainages.
Mimosa wilt, <u>Fusarium</u> <u>oxysporum</u> (Schl.) em. Snyd. & Hans.	Mimosa	Fla., Ga., N.C., S.C., Tenn., La., Ala., and Miss.	Continues to kill trees over a large area.

ANTHRACNOSE, BLIGHT, DECLINE, OR WILT (con't)

<u>Disease</u>	<u>Host(s)</u>	<u>Location</u>	<u>Remarks</u>
White pine root decline, <u>Verticicladiella</u> <u>procera</u> Kend.	Eastern white pine	Ky., N.C., S.C., and Va.	Scattered dying of white pine, primarily on wet sites. Seems to be more common in Christmas tree plant- ings.
Littleleaf, <u>Phytophthora</u> <u>cinnamomi</u> Rands.	Shortleaf	Ga., S.C., and Ala.	Several thousand acres affected.
Elm phloem necrosis, virus disease	Elm	Ala., N.C., and Ky.	Scattered single tree or groups--primarily urban.
Tip blight, <u>Diplodia</u> sp.	Austrian and Scotch pine	Okla. and Ky.	Common in urban and ornamental plantings.
<u>Verticillium</u> wilt, <u>Verticillium</u> sp.	Maple	Va.	Scattered trees.

CANKER OR ROT

Root rot, <u>Armillariella</u> <u>mellea</u> (Fr.) Karst. <u>Armillariella</u> <u>tabescens</u> (Fr.) Singer <u>Phaeolus</u> <u>schweinitzii</u> (Fr.) Pat. <u>Phytophthora</u> sp.	All species	Throughout Southeast.	Annual losses are estimated at 1 to 2% with a range of 0 to 80% in individual stands.
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CANKER OR ROT (cont'd)

<u>Disease</u>	<u>Host(s)</u>	<u>Location</u>	<u>Remarks</u>	<u>ks</u>
Root rot, <u>Heterobasidion</u> <u>annosum</u> (<u>Fomes</u>) <u>annosus</u> (Fr.) Bref.	Loblolly, slash, and shortleaf pines	Throughout Southeast.	Continues to be the most serious root rot concern in the South. Most of the losses occur on high hazard sites where thinning has been done.	
Resin soak root disease, <u>Armillariella</u> <u>tabescens</u> (Fr.) Singer <u>Phaeolus schweinitzii</u> (Fr.) Pat <u>Inonotus circinatus</u> (Fr.) Gilbs <u>Verticicladiella procera</u> Kendrik <u>Phytophthora</u> sp.	Sand pine	Fla, Ga., and S.C.	Causing over 2 million dollars annual loss in Fla. each year. <u>Phytophthora</u> sp. seems to be the primary pathogen in nurseries and young plantings. <u>Inonotus circinatus</u> seems to be the pri- mary pathogen in older stands.	
Root rot, <u>Ganoderma</u> <u>tsugae</u> Murr. and <u>G. lucidum</u> (Leys. ex. Fr.) Karst.	Loblolly pine and oak	Ala., Fla., Ga., Miss., and La.	Appears to be active on droughty sites. Generally distributed as a result of 1980 drought.	
Black knot, <u>Dibotryon</u> <u>morbosum</u> (Schw.) Th. and Syd.	Black cherry	Ga., Ky., N.C., S.C., and Tenn.	Light to severe losses reported.	
Hypoxylon canker, <u>Hypoxylon</u> <u>atropunctatum</u> (Schw. ex Fr.) Cke.	Red oak group	Ga., Fla., N.C., S.C., Va., Ky., Tenn., Miss., La., Ark., Okla., Ala., and Tex.	Common on drought- weakened and killed trees throughout the area.	

CANKER OR ROT (cont'd)

<u>Disease</u>	<u>Host(s)</u>	<u>Location</u>	<u>Remarks</u>
Butternut canker, <u>Sirococcus</u> sp.	Butternut	Ky. to Va.	Most of the sapling and larger trees are dead or infected. Nut production seems reduced on infected trees.
Fusarium canker, <u>Fusarium</u> <u>solani</u> (Mart.) App. & Wr. em. Snyd. and Hans.	Yellow poplar, black walnut, sweetgum	Ky., N.C., S.C., and Tenn.	Scattered occurrence; more severe in sapling to pole timber size trees.
White pine blister rust, <u>Cronartium</u> <u>ribicola</u> Fisch.	Eastern white pine	N.C. and Va.	Very low occurrence throughout known range.
Sweet fern blister rust, <u>Cronartium</u> <u>comptoniae</u> Arth.	Virginia pine	Va.	Especially severe in stress areas.
Comandra rust, <u>Cronartium</u> <u>comandrae</u> Pk.	Loblolly pine	Eastern Tenn.	Found over a 10-county area--damage is light.
Eastern gall rust, <u>Cronartium</u> <u>quercuum</u> (Berk.) Miy. ex. Shirai f. sp. <u>quercuum</u>	Virginia pine	N.C., Tenn., and Va.	Light damage.

CANKER OR ROT (cont'd)

<u>Disease</u>	<u>Host(s)</u>	<u>Location</u>	<u>Remarks</u>
Chestnut blight, <u>Endothia</u> <u>parasitica</u> (Murr.) P. J. and H. W. And.	American chestnut	Throughout chestnut range	Almost complete mor- tality of older trees.
Pitch canker <u>Fusarium</u> <u>moniliforme</u> var. <u>subglutinans</u> Wr. & Reink	Virginia, slash, short- leaf, longleaf, loblolly, eastern white, scotch, sand, tablemountain, pitch, and Monterey pines	Fla., Ga., N.C., S.C., Tenn., Va., Ala., Miss., and La.	Seems especially severe in certain seed orchards, and Fla. occurrence is down from the 1977 Fla. survey.
Decay, primarily fungi in the the Polyporaceae	Hardwoods	General through- out Southeast	Causing substantial losses. Especially severe where hardwoods have been burned.

ENVIRONMENT OR POLLUTION

<u>Damage</u>	<u>Host(s)</u>	<u>Location</u>	<u>Remarks</u>
Construction damage	All trees	General through- out the South.	Urban foresters con- tinue to report severe damage from this com- plex of causes.
Pollution	Eastern white pine	N.C., S.C., VA., Ky., and Tenn.	About 10 percent of the white pine were affected in the moun- tains over the 5 state area. Probably caused by ozone.

ENVIRONMENT OR POLLUTION (cont'd)

Damage	Host(s)	Location	Remarks
Lightning	All pines	Ga., S.C., N.C., Fla., and Tex.	Increased incidence reported as a result of increased thunderstorm activity.
Snow	All species	N.C., Ky., and Tenn.	Limb breakage.
Freeze injury	Black locust	N.C. and Tenn.	Many trees in the mountains were frozen back to the ground and resprouted.

LEAF OR NEEDLE DISEASES

Disease	Host(s)	Location	Remarks
Melampsora rust, <u>Melampsora medusae</u> Thum.	Poplars	Throughout poplar range.	Caused premature defoliation of the species in localized areas.
Brown spot, <u>Scirrhia acicola</u> (Dearn.) Sigg.	Longleaf and slash pines	Fla., Ga., La., Ala., S.C., N.C., and Miss.	Light damage in most areas with severe losses in localized areas.
Oak leaf blister, <u>Taphrina caerulescens</u> (Mont. & Desm.) Tul.	Red oaks	N.C., S.C., La., Ark., and Miss.	Scattered throughout range, but not severe.
Pine needle rust, <u>Coleosporium</u> sp.	Hard pines	S.C., N.C., Fla., Ga., Va., and Tenn.	Little damage, but widespread.

LEAF OR NEEDLE DISEASES (cont'd)

<u>Disease</u>	<u>Host(s)</u>	<u>Location</u>	<u>Remarks</u>
Needle cast, <u>Lophodermium</u> spp.	All southern yellow pines	Fla., S.C., N.C., Ga., Ala., and Miss.	Locally severe, caus- ing partial defolia- tion of affected trees. An extremely noticeable problem; greatest impact is on visual quality in parks.
Needle blight, <u>Dothistroma</u> sp.	Austrian pine	Okla.	Common in urban areas.
Actinopelete leaf spot, <u>Actinopelte</u> <u>dryina</u> (Sacc.) Hoehn.	Red oaks	S.C., N.C., Tenn., and Va.	Especially severe on pin oaks.
Tar spot, <u>Rhytisma</u> <u>acerinum</u> Pers. ex Fr.	Maple	Ga., N.C., and S.C.	No damage to host.
Powdery mildew, <u>Microsphaera</u> <u>alni</u> DC. ex Wint.	Cherry	Va.	No damage.

OTHER PROBLEMS

Pine wood nematode, <u>Bursaphelenchus</u> <u>lignicolus</u> Mam. and Kiyo	Scotch, loblolly, Japanese, eastern white pine	Va., N.C., S.C., Ga., Fla., Tenn., Ky., Ark., La., Okla., Ala., Tex., and Miss.	Reports continue, but concern has diminished since this pest now appears to be endemic to the U.S.
Slime flux, <u>Erwinia</u> <u>nimipressuralis</u> Cart.	Oak	Northern Ga., Ky., N.C., S.C., Tenn., and Va.	About 0.1 percent of the oaks seem to be affected; usually associated with decay

STATUS OF NURSERY PESTS

The root rot fungus Macrophomina phaseolina caused the loss of 100,000 one-year-old dogwood seedlings, valued at \$6,000 in a Florida nursery during the late summer 1981.

Fusiform rust, Cronartium quercuum (Berk.) Miyabe ex Shirai f. sp. fusiforme Burdsall and Snow, caused severe losses (more than 100,000 seedlings) to one-year-old slash pine seedlings during the 1981 growing season in a Florida nursery.

Cylindrocladium root rot (Cylindrocladium crotalariae - Calonectria crotalariae) caused localized seedling damage to one-year-old yellow-poplar and sweetgum seedlings, along with two-year-old eastern white pine seedlings, in a North Carolina nursery during the early fall 1981. Disease incidence and plantable seedling losses were most severe (several thousand seedlings) on the 1-0 yellow-poplar seedlings.

Pythium root rot (Pythium spp.) caused severe seedling stunting, yellowing, and feeder root necrosis on several million two-year-old eastern white pine seedlings in a Tennessee nursery. This disease problem has been recurrent at this nursery during the past 6-8 years. Soil fumigation, with a methyl bromide-98 percent, chloropicrin-2 percent formulation, has provided erratic control results.

The systemic fungicide metalaxyl (Ridomil or Subdue - Ciba-Geigy Co.) has provided very effective control (over 95 percent effectiveness) of Phytophthora root rot (Phytophthora cinnamoni Rands) on Fraser fir seedlings in a North Carolina nursery. Periodic annual Phytophthora root rot losses on Fraser fir seedlings have exceeded 50 percent in this nursery during the past 10 years.

The lesser cornstalk borer, Elasmopalpus lignosellus (Zeller), has caused severe damage to one-year-old Arizona cypress, bald cypress, dogwood, and loblolly pine seedlings in a Florida nursery during the 1981 growing season.

FIELD SURVEILLANCE

Field surveillance is a key element in the management of forest insects and diseases in the South. The Forest Pest Management staff, Southeastern Area, depends on the assistance of all field personnel to alert them to potential insect and disease problems. Early detection of damage could prevent serious losses in the future.

The Forest Pest Management staff is strengthening its field surveillance system on federal lands. To help implement field surveillance, a Detection Report, Form 3400-1, is being used. This form consists of a booklet of triplicate report sheets which are carbon treated. The reporter sends in the white and blue copies and keeps the pink copy. Directions for shipment of samples and filling out the form are included.

Whenever the causal agent is unknown or confirmation is needed, insect or disease specimens or damage samples should be submitted with the form. Send the report and samples to the Doraville office (see page vi). Copies of the Detection Report booklet are available from the same address.

FIELD OFFICE NUMBERED REPORTS

Report No.	Title	Author
Asheville Field Office		
81-1-1	An Evaluation of Insect Damage in Southern Federal Seed Orchards	L. R. Barber N. A. Overgaard
81-1-2	Comparison of Two Seed Stratification Methods for Slash and Loblolly Pine at the Resistance Screening Center	S. D. Hubbard C. H. Young J. L. Knighten
81-1-3	Effect of Type and Number of Nozzles on Pine Inoculation with Fusiform Rust Basidiospores	S. D. Hubbard G. Ryan
81-1-4	Occurrence of Internal Seed Fungi in Slash Pine Produced in Seed Orchards	R. L. Anderson E. Belcher T. Miller
81-1-5	Biological Evaluation of Southern Pine Beetle Infestations on the Francis Marion-Sumter National Forests	H. Lambert W. H. Hoffard P. J. Barry
81-1-6	A Handbook for Recognizing Insect, Disease, and Various Types of Damage on Eucalypts in Florida	M. Martin R. L. Anderson V. Fisher T. Gentry
81-1-7	Letter, Virginia Pine, Piedmont State Nursery	R. L. Anderson C. E. Cordell
81-1-8	Letter, Cape Hatteras Facility	W. H. Sites
81-1-9	RSC Test 101-80	S. D. Hubbard

Report No.	Title	Author
81-1-10	RSC Test 105-80	S. D. Hubbard
81-1-11	Letter, Wood Structures on Portsmouth Island	W. H. Sites
81-1-12	Detection and Evaluation of the Balsam Woolly Aphid Infestations on Mount Rogers, Virginia, 1980	D. Haneman H. Lambert
81-1-13	Status Report of the Introduced Pine Sawfly Outbreak in the Southern Appalachians	J. Ghent C. M. Huber
81-1-14	Biological Evaluation of the Cypress Looper Outbreak on the Big Cypress National Preserve in Florida	W. Carothers J. Ghent
81-1-15	RSC Test 102-80	S. D. Hubbard
81-1-16	SPB Post Suppression Evaluation for the Chattahoochee-Oconee National Forest, Fiscal Year 1980	W. H. Hoffard
81-1-17	SPB Post Suppression Evaluation for the Francis Marion-Sumter National Forests	W. H. Hoffard
81-1-18	RSC Test 106-80	S. D. Hubbard
81-1-19	RSC Test 109-80	S. D. Hubbard
81-1-20	Incidence of Diseases and Insects in Selected Eucalypt Plantations, Southern Florida	M. Martin R. L. Anderson

Report No.	Title	Author
81-1-21	RSC Test 107-80	S. D. Hubbard
81-1-22	RSC Test 108-80	S. D. Hubbard
81-1-23	Incidence and Distribution of Fusiform Rust on the Francis Marion National Forest, S.C.	R. L. Anderson V. Fisher
81-1-24	Biological Evaluation of SPB Infestations on Camp Lejeune Marine Corps Base, N.C.	P. J. Barry
81-1-25	RSC Status Report	S. D. Hubbard
81-1-26	Evaluation of Mortality in a European Black Alder Seed Production Area, Gilbertsville, KY, 1981	S. Oak R. Dorset
81-1-27	Biological Evaluation - Progeny Test Areas, Chattahoochee National Forest, GA, and Pisgah National Forest, NC	P. J. Barry
81-1-28	Status of the Fall Cankerworm on the Clinch Ranger District, Jefferson National Forest, 1981	J. Ghent C. Stone
81-1-29	Evaluation of Insect and Disease Pests of Trees in Puerto Rico, 1981	R. L. Anderson P. J. Barry
81-1-30	An Evaluation of Defoliation, Barren River Lake, Ky., 1981	J. Ghent W. Carothers
81-1-31	Losses Caused by Defects in Black Walnut on the Daniel Boone National Forest	R. L. Anderson P. Kovalic

Report No.	Title	Author
81-1-32	Occurrence of Internal Seed Fungi in Slash Pine Seed Produced in Seed Orchards (Second Year Status Report)	R. L. Anderson E. Belcher
81-1-33	Symptom Type Expression Under Three Lighting Systems at the RSC	S. D. Hubbard C. Young J. Knighten
81-1-34	Status and Post Suppression of Balsam Woolly Aphid Infestations on Roan Mountain, Toecane Ranger District, Pisgah National Forest, N.C.	P. J. Barry
81-1-35	SPRD on the Ocala National Forest, Florida: Incidence and Losses, 1980	S. Oak R. L. Anderson G. Ryan R. J. Uhler J. W. Lewis
81-1-36	Incidence and Distribution of Fusiform Rust on the Sumter National Forest, SC, 1981	R. L. Anderson J. Knighten M. Martin
81-1-37	RSC Test 105-79	S. D. Hubbard
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81-1-39	Inoculation Systems Comparison at the RSC, March 1981	S. D. Hubbard J. Triplett S. Oak
81-1-40	RSC Test 110-80	S. D. Hubbard
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81-1-42	RSC Test 107-80	S. D. Hubbard
81-1-43	RSC Test 109-80	S. D. Hubbard
81-1-44	RSC Test 103-80	S. D. Hubbard
81-1-45	RSC Test 108-80	S. D. Hubbard
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81-1-48	An Evaluation of a Proposed Recreation Site on the Stanton Ranger District, Daniel Boone National Forest	W. H. Sites
81-1-49	An Evaluation of Several Areas in Mammoth Cave National Park	W. H. Sites
81-1-50	An Evaluation of the White Pine at the Linville Falls Picnic Area	W. H. Sites
81-1-51	RSC Test 113-80	R. L. Anderson
81-1-52	Biological Evaluation of <u>Ips</u> Bark Beetle Infestations on Cumberland Island National Seashore, Ga.	W. Carothers W. H. Hoffard T. S. Price K. G. Thomas G. Brandau
81-1-53	RSC Test 110-81	R. L. Anderson

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81-1-54	Fusiform Rust: Acres of Slash and Loblolly Pine with 10, 20, 30, 40, and over 50 Percent of the Trees Infected with Fusiform Rust	R. L. Anderson N. D. Cost J. P. McClure P. Mistretta
81-1-55	RSC Test 101-81	R. L. Anderson
81-1-56	RSC Test 103-81	R. L. Anderson
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81-1-58	Distribution of the Introduced Pine Sawfly in the Southern Appalachians	J. Ghent C. Stone A. Buchanan
81-1-59	SPB Post Suppression Evaluation for Camp Lejeune Marine Corps Base, N.C., FY 1980-1981	C. M. Huber P. J. Barry

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Doraville Field Office		
81-3-1	Aerial Detection Survey of Forest Insect & Disease Activity, Natchez Trace Parkway, Miss.	Wilson, Russell
81-3-2	Aerial Detection Survey of Forest Insect & Disease Activity, Cherokee National Forest, Tenn.	Wilson, Russell
81-3-3	Aerial Detection Survey of Forest Insect & Disease Activity, Sam Houston National Forest, Tex.	Bassett, Russell, Jackson
81-3-4	Aerial Detection Survey of Forest Insect & Disease Activity, Kisatchie National Forest, La.	Dull, Nettleton, Sebastian
81-3-5	Aerial Detection Survey of Forest Insect & Disease Activity, Daniel Boone National Forest, Ky.	Carothers, Buckner
81-3-6	Aerial Detection Survey of Forest Insect & Disease Activity, Tennessee Valley Authority, Land Between the Lakes	Carothers, Buckner
81-3-7	Aerial Detection Survey of Forest Insect & Disease Activity, Jefferson National Forest, Va.	Autry, Buckner
81-3-8	Aerial Detection Survey of Forest Insect & Disease Activity, National Forests in Tex.	Bassett, Russell
81-3-9	Aerial Detection Survey of Forest Insect & Disease Activity, Federal, State & Private Lands, Kentucky	Carothers, Ghent, Brandau

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81-3-10	Aerial Detection Survey of Forest Insect & Disease Activity, Ozark-St. Francis National Forest, Ark.	Bassett, Russell
81-3-11	Aerial Detection Survey of Forest Insect & Disease Activity, Tallulah & Brasstown Ranger Districts, Chattahoochee National Forest, Ga.	Bassett, Russell
81-3-12	Aerial Detection Survey of Forest Insect & Disease Activity, Shenandoah National Park, Va.	Dull, Haskell, March
81-3-13	Aerial Detection Survey of Forest Insect & Disease Activity, George Washington National Forest, Va.	Dull, Brandau
81-3-14	Aerial Detection Survey of Forest Insect & Disease Activity, Northern Virginia	Dull
81-3-15	Aerial Detection Survey of Forest Insect & Disease Activity, William B. Bankhead National Forest, Ala.	Bassett, Russell
81-3-16	Aerial Detection Survey of Forest Insect & Disease Activity, Chattahoochee National Forest, Ga.	Bassett, Russell
81-3-17	Aerial Detection Survey of Forest Insect & Disease Activity, Uwharrie National Forest, N.C.	Brandau, Ghent
81-3-18	Aerial Detection Survey of Forest Insect & Disease Activity, Croatan National Forest, N.C.	Brandau, Ghent

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81-3-19	Aerial Detection Survey of Forest Insect & Disease Activity, Cherokee National Forest, Tenn.	Bassett, Russell
81-3-20	Aerial Detection Survey of Forest Insect & Disease Activity, Bienville National Forest, Miss.	Wilson, Russell
81-3-21	Aerial Detection Survey of Forest Insect & Disease Activity, Homochitto National Forest, Miss.	Wilson, Russell
81-3-22	Aerial Detection Survey of Forest Insect & Disease Activity, Osceola National Forest, Fla.	Russell, Brandau
81-3-23	Aerial Detection Survey of Forest Insect & Disease Activity, Apalachicola National Forest, Fla.	Russell, Brandau
81-3-24	Aerial Detection Survey of Forest Insect & Disease Activity, Talladega National Forest, Ala.	Bassett, Brandau
81-3-25	Aerial Detection Survey of Forest Insect & Diseases, Horseshoe Bend National Military Park, Ala.	Bassett, Ghioto
81-3-26	Aerial Detection Survey of Forest Insect & Disease Activity, Tuskegee National Forest & Conecuh National Forest, Ala.	Dull, Russell

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Pineville Field Office		
81-2-1	Evaluation of Selected Southern Pine Beetle Infestations in Rate II and Proposed Wilderness Areas Within the Black Warrior Ranger District	J. Weatherby
81-2-2	Biological Evaluation of Southern Pine Beetle on the National Forest in Mississippi	M. D. Connor W. Nettleton
81-2-3	Biological Evaluation of Dieback Conditions on Shortleaf Pine in Stuart Seed Orchard	F. L. Oliveria R. Miller
81-2-4	Biological Evaluation of Pitch Canker Incidence in Seed Orchards in Louisiana, Mississippi, Texas, and Alabama	R. E. Miller S. A. Covington C. T. Sutton
81-2-5	Evaluation of Southern Pine Beetle Infestations on the National Forests in Alabama	J. Weatherby
81-2-6	Detection and Incidence of Tip Blight of Loblolly Pine at the W. W. Ashe Nursery	C. E. Affeltranger George W. Ryan
81-2-7	Letter, Baseline Plant Pathology Data for the Big Thicket National Preserve	R. C. Loomis P. A. Mistretta
81-2-8	SPB Post Suppression Project Evaluation for the National Forests in Alabama	J. Weatherby
81-2-9	Biological Evaluation of Southern Pine Beetle on the Natchez Trace Parkway in Mississippi	M. D. Connor H. N. Wallace

Report No.	Title	Author
81-2-10	Recommended Pathological (Mycological) Nomenclature for Current Use in the Southeastern Area	P. A. Mistretta
81-2-11	Letter, Summary of the Information, Hot Springs National Park	R. C. Loomis P. A. Mistretta
81-2-12	SPB Post Suppression Evaluation for Mississippi National Forests	M. D. Connor W. A. Nettleton
81-2-13	Trip Report - Holly Springs	P. A. Mistretta M. D. Connor
81-2-14	Survival and Performance of Tip-Blight Infected Loblolly Pine	C. E. Affeltranger
81-2-15	An Evaluation of Three Year Loss of Loblolly Pine to Annosus Root Rot Following Thinning	R. Miller R. Collins S. Covington P. Mistretta
81-2-16	Progress Report - Pilot Test for Controlling Coneworms and Seedbugs by Aerial Application of Pydrin and Guthion the Beauregard Seed Orchard, Louisiana	N. A. Overgaard
81-2-17	Monitoring of Cone and Seed Insect Damage to Loblolly Pine at the Stuart Orchard, Pollock, La.	N. A. Overgaard H. N. Wallace
81-2-18	Volume Impact of Fusiform Rust as a Comparison of Actual Yield from Slash Pine Plantations in Central Louisiana to Yields Projected Using an Ideal Survival Model for the West Gulf Region	C. E. Affeltranger

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81-2-19	Evaluation of Timing Guthion Sprays According to Coneworm Infestation Levels on a Shortleaf Pine Seed Orchard	N. A. Overgaard H. N. Wallace S. A. Covington
81-2-20	Post-Treatment Evaluation of Seed and Cone Insect Control Project at Stuart Seed Orchard, Pollock, La., 1980	N. A. Overgaard
81-2-21	Post-Treatment Evaluation Seed and Cone Insect Control Project, Ouachita Federal Seed Orchard, 1980	N. A. Overgaard
81-2-22	Evaluation of the Insecticide Control Program at the Geneva State Seed Orchard Alabama Forestry Commission, 1981	J. Weatherby
81-2-23	Biological Evaluation of Poplar Tent-maker Populations of a Cottonwood Plantation at Profit Island, La.	N. A. Overgaard K. Jeane
81-2-24	Evaluation of Poplar Tentmaker Populations on a Cottonwood Plantation, Profit Island, La.	N. A. Overgaard
81-2-25	Biological Evaluation of Southern Pine Beetle on the National Forest in Miss.	W. A. Nettleton M. D. Connor
81-2-26	Evaluation of Oak Mortality on the Ozark National Forest, Ark., 1981	P. A. Mistretta C. E. Affeltranger D. A. Starkey S. A. Covington Z. M. Wortham
81-2-27	Evaluation of Cottonwood Decline and Mortality in the Riparian Woodland of the Beaver River in Texas County, Okla., 1981	D. A. Starkey P. A. Mistretta K. Atkinson N. A. Overgaard S. A. Covington Z. M. Wortham

OTHER PUBLICATIONS

Publication No.	Title	Author
SA-FB/p 22	Pest Alert: Pitch Canker in Forest Tree Nurseries	Blakeslee Miller Barnard
SA-FB/p 23	"How to Control White Pine Blister Rust in the Southern Appalachian Mountains"	Anderson Artman Doggett Cordell
SA-FB/p 24	How to Identify Fusiform Rust and What to do About It	Anderson Powers Snow
SA-FB/p 25	"How to Identify and Control Phomopsis Blight in Junipers"	Anderson Martin Peterson
SA-FB/p 29	Pest Alert: Tip Blight of Southern Pine Seedlings	Affeltranger
SA-FB/p 30	Loran-C Navigation	Dull
SA-FB/p 31	Use of Beetle-Killed Timber for Particleboard and Hardboard	Kelley Levi
SA-FB/p 32	TBAP--Timber Benefits Analysis Program	Lewis Uhler
SA-FB/p 33	Salvage Removal	Swain Remion
SA-FB/p 34	Cut-and-Leave	Swain Remion
SA-FB/p 35	Chemical Control	Swain Remion

Publication No.	Title	Author
SA-FB/p 36	Pile-and-Burn	Swain Remion
SA-FB/p 37	A Method of Assessing the Impact of Southern Pine Beetle Damage of Esthetic Values	Lewis
SA-FB/p 38	Economic Impact of Southern Pine Beetle on Recreation--one approach	Lewis
SA-FB/p 39	Pest Alert: Outbreak of the Cypress Looper	Carothers Ghent
SA-FB/p 40	Silviculture: A Means of Preventing Loss from the Southern Pine Beetle	Belanger
SA-FB/p 41	Setting Control Priorities Using Emergence/Attack Ratios	Moore
SA-FB/p 42	DAMBUGS: A Case Study	Lewis
SA-FR 9	Forest Management Practices to Prevent Insect and Disease Damage to Southern Pine	Anderson Rogers Williston
SA-FR 11	Pitch Canker of Southern Pines: Identification and Management Conditions	Anderson Blakeslee Dwinell
SA-GR 11	The Resistance Screening Center: Screening for Fusiform Rust Resistance as a Service for Tree Improvement Programs	Hubbard

Publication No.	Title	Author
SE-8	Seed and Cone Insects of Southern Pine	Ebel Flavell Drake Yates DeBarr
SA-TB 13	Southern Pine Beetle Technology Transfer Coordinating Council Report	Hertel

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PESTICIDE PRECAUTIONARY STATEMENT

Pesticides used improperly can be injurious to man, animals, and plants. Follow the directions and heed all precautions on the labels.

Store pesticides in original containers under lock and key - out of the reach of children and animals - and away from food and feed.

Apply pesticides so that they do not endanger humans, livestock, crops, beneficial insects, fish, and wildlife. Do not apply pesticides when there is danger of drift, when honey bees or other pollinating insects are visiting plants, or in ways that may contaminate water or leave illegal residues.

Avoid prolonged inhalation of pesticide sprays or dusts; wear protective clothing and equipment if specified on the container.

If your hands become contaminated with a pesticide, do not eat or drink until you have washed. In case a pesticide is swallowed or gets in the eyes, follow the first-aid treatment given on the label, and get prompt medical attention. If a pesticide is spilled on your skin or clothing, remove clothing immediately and wash skin thoroughly.

Do not clean spray equipment or dump excess spray material near ponds, streams, or wells. Because it is difficult to remove all traces of herbicides from equipment, do not use the same equipment for insecticides or fungicides that you use for herbicides.

Dispose of empty pesticide containers promptly. Have them buried at a sanitary land-fill dump, or crush and bury them in a level, isolated place.

NOTE: Some States have restrictions on the use of certain pesticides. Check your State and local regulations. Also, because registrations of pesticides are under constant review by the Federal Environmental Protection Agency, consult your State forestry agency, county agricultural agent, or State extension specialist to be sure the intended use is still registered.



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